

National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

AIRS Project Status

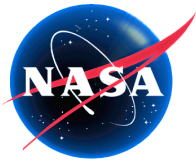
Thomas S. Pagano

California Institute of Technology, Jet Propulsion Laboratory,
4800 Oak Grove Dr. Pasadena

April 21, 2010

NASA Souder Science Team Meeting
Greenbelt, MD

Copyright 2009 California Institute of Technology. Government sponsorship acknowledged.

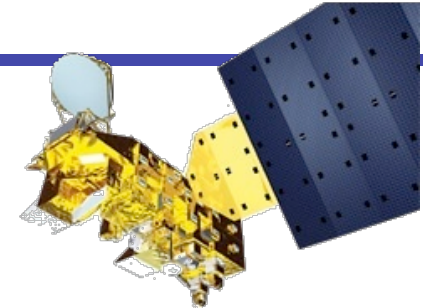


National Aeronautics and
Space Administration

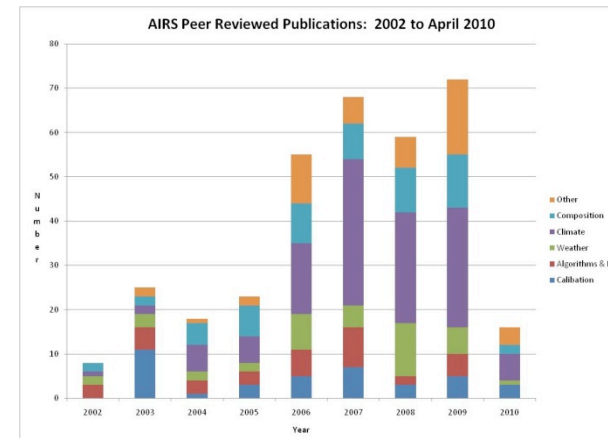
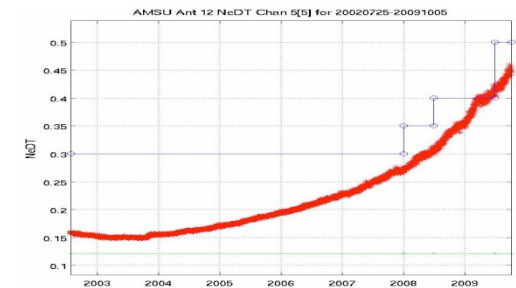
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

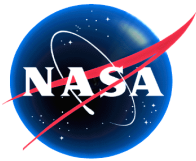
Instrument and Spacecraft Status

- Aqua in good health—fuel will last at least through 2017 and probably several years beyond
- AIRS is in excellent health
 - Most engineering parameters are not changing
 - A few are slowly varying
 - If their present trends continue they will be fine until well after Aqua fuel runs out
 - Planning Gain Table Update to Recover “Lost” Channels due to Radiation Exposure
- AMSU-A is in reasonable health
 - Channel 4 died (late 2007)
 - Channel 5 is degrading but should be useful until sometime this year
 - Channel 7 has been noisy since launch
- AIRS Science Strong
 - Over 325 Peer Reviewed Pubs to Date
 - Weather
 - Climate
 - Composition



AMSU Ch5 Noise





National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Science Goals and Objectives

• Objectives

– Improve Weather Forecast

- Accomplished 6 Hrs on 5 Day Forecast (LeMarshall 2005)
- Improved Tropical Cyclone Nargis Track (Reale 2008)

– Understand Water Cycle

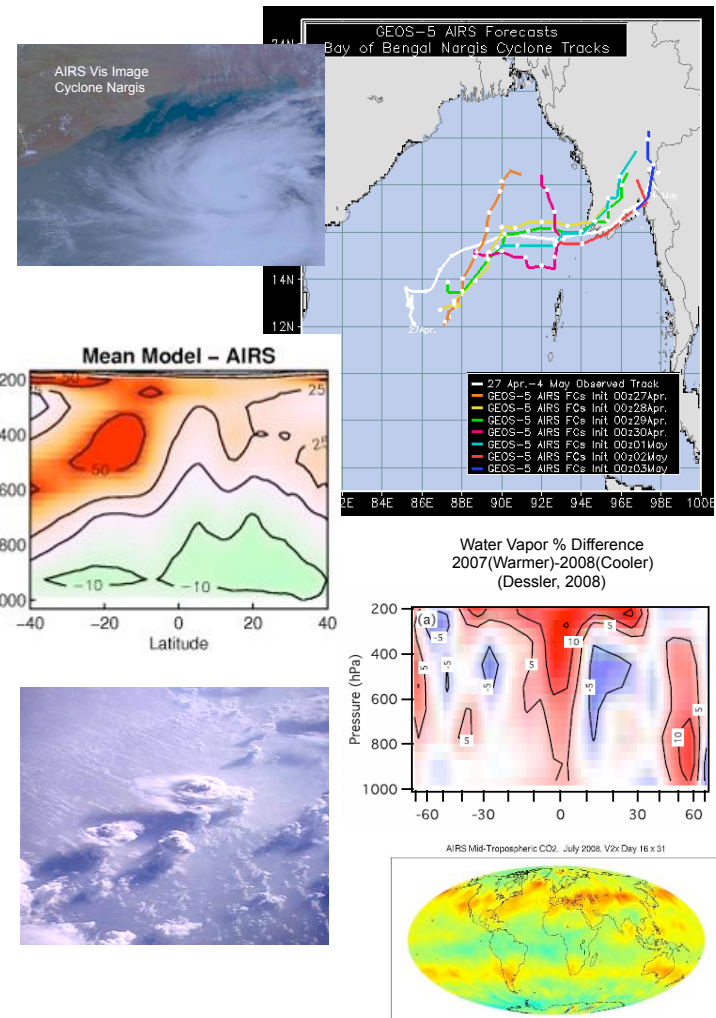
- Used for Climate Model Validation (Pierce 2006, John 2008, Gettleman 2008)
- Quantify Water Vapor Feedback (Dessler, 2008)
- Frequency of Severe Storms with Global Warming (Aumann 2008)
- Properties of Cirrus Clouds (Kahn 2008)

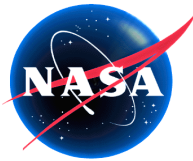
• Research Goals

– Measure Greenhouse Gases

- Global Maps of Mid-Trop CO₂ 6 Years (Chahine, 2008)
- Daily Maps of Global CO, O₃, SO₂ Products (McMillan 2007, Divakarla 2008, Prada 2008)
- Research Products CH₄ (Xiong, 2008)

• AIRS is a Facility Instrument



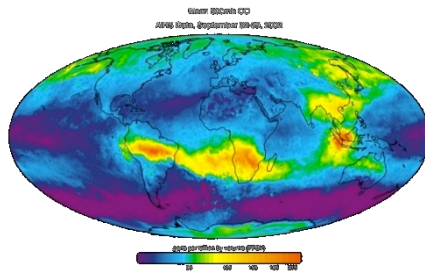


National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

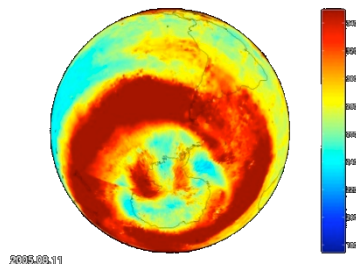
AIRS Geophysical Products

CO

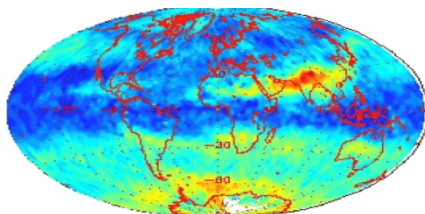


Greenhouse Gas Forcing

Ozone

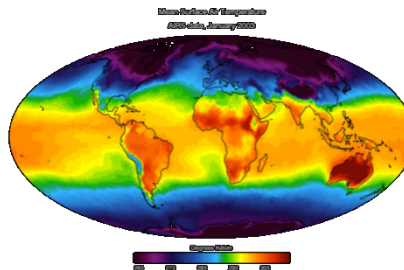


Methane

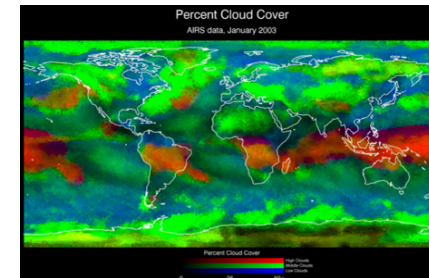


Clouds and Water Vapor Feedback

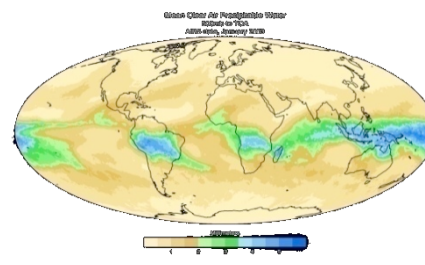
Atmospheric Temperature



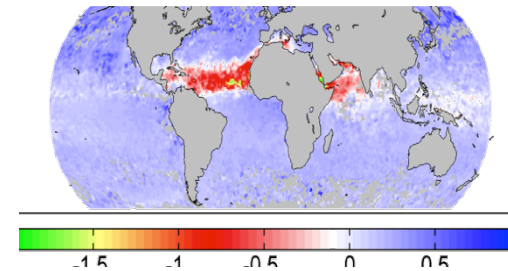
Cloud Properties



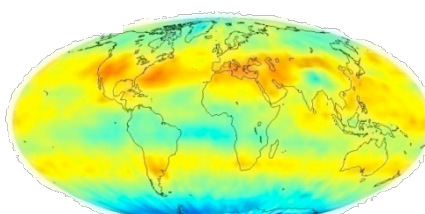
Atmospheric Water Vapor



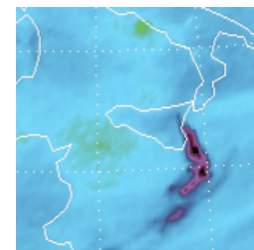
Dust



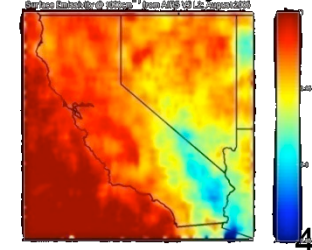
CO2

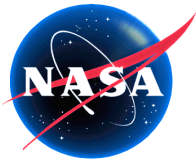


SO2



Emissivity





National Aeronautics and
Space Administration

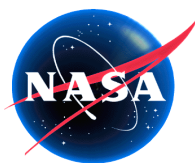
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Most Version 6 Algorithm Improvements Demonstrated

From 10/07 SciTeam Meeting

- Susskind (GSFC)
 - Surface Parameters (T, e)
 - Boundary Layer T, q
 - Trend Evaluations/Recommendations
 - Improved Error Estimates and QC
 - Cloud/Dust Product Improvement
 - 1 x 3 Retrievals
- Strow (UMBC)
 - L1C Algorithm
 - RTA Scattering Algorithm
 - Additional RTA Tasks
 - Dust
 - Cirrus
 - OLR
- Blackwell (MIT)
 - SCC/NN Investigation
- Barnet (NOAA)
 - Bias Trends Removal
 - Cloud Clearing vs Warmest FOV
 - CO₂
 - SO₂, CH₄, HNO₃, N₂O, O₃
 - CAPE, LI + Convective Products
 - 1x3 (NOAA Interest, SPORT, Forecasters, etc.)
- Goldberg (NOAA)
 - Initialization State (Regression Coefficients)
 - Maintain RT System
- Rosenkranz (MIT)
 - Updated MW RTA
- JPL Science Team Algorithms
 - CO₂ (Chahine)
 - Clouds (B. Kahn)
 - L1C (H. Aumann)

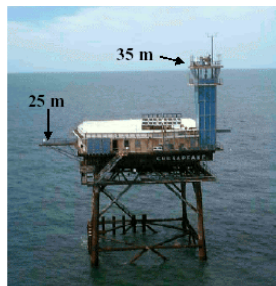
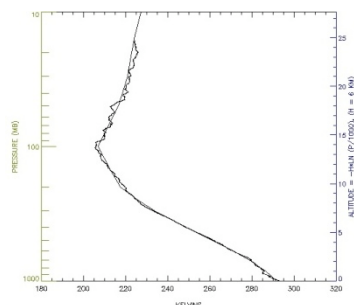
Behind Schedule! Need V6 completion plan by end of this meeting!



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

AIRS Remembers Wallace McMillan



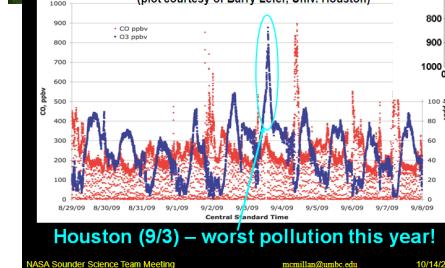
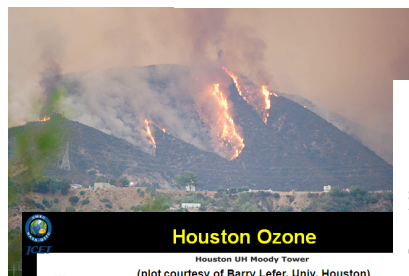
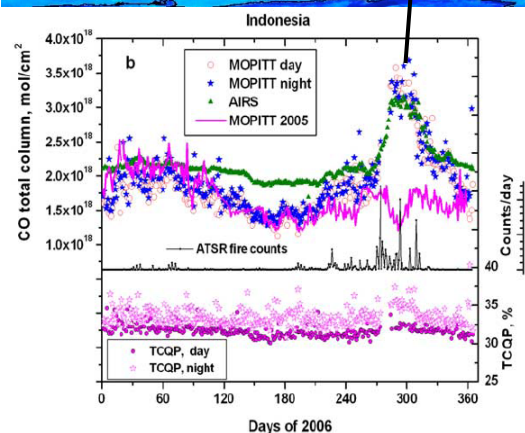
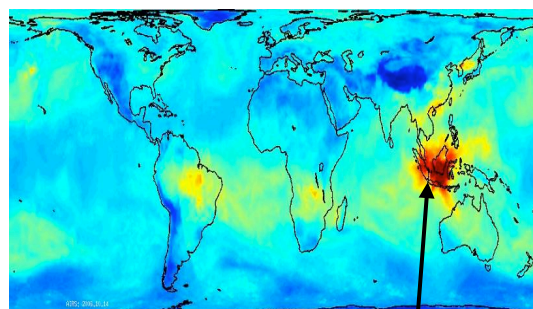
In Memory of



Wallace McMillan
UMBC

Key AIRS Pubs by Wallace:

- McMillan W. W., C. Barnet, L. Strow, M. T. Chahine, M. L. McCourt, J. X. Warner, P. C. Novelli, S. Korontzi, E. S. Maddy, S. Datta (2005), Daily global maps of carbon monoxide from NASA's Atmospheric Infrared Sounder, Geophys. Res. Lett., 32, L11801, doi: 10.1029/2004GL021821.
- McMillan, W. W., et al. (2008), AIRS views transport from 12 to 22 July 2004 Alaskan/Canadian fires: Correlation of AIRS CO and MODIS AOD with forward trajectories and comparison of AIRS CO retrievals with DC-8 in situ measurements during INTEX-A/ICARTT, J. Geophys. Res., 113, D20301, doi: 10.1029/2007JD009711.
- Co-Author on 11 Additional AIRS Publications

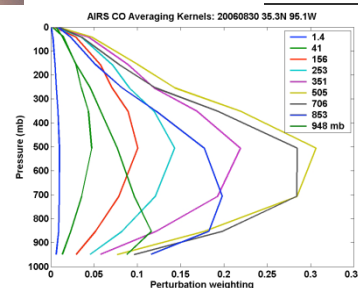


Houston (9/3) – worst pollution this year!

NASA Sounder Science Team Meeting

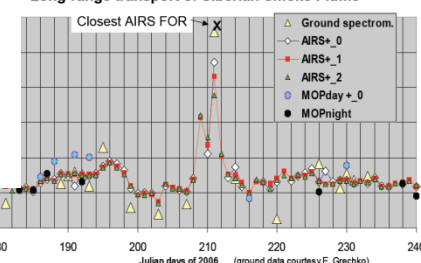
mcmillan@umbc.edu

10/14/2009

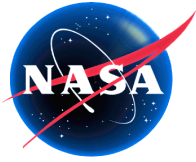


AIRS CO Column: Zevnigorod, Rus.

Observation at Zevnigorod, Russia (56N, 37E) July 30, 2006
Long-range transport of Siberian Smoke Plume



AIRS Science Team Meeting <http://physics.umbc.edu/~mcmillan> 3/28/07



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Plans for the Future

- **AIRS/NASA Sounding Science Team**
 - What are science objectives for Version 7?
 - Version 7 could have 2 flavors*
 - Baseline: Unified Team Algorithm with Climate Product Emphasis
 - Research*: New Algorithm focused on Atmospheric Composition
 - *Pending additional project and science team funding.
- **NASA Atmospheric Sounding Program**
 - NASA interested in developing sounding products in conjunction with NOAA and the scientific community from AIRS, CrIS and IASI for weather, climate and composition research
- **Other Happenings**
 - Requirements for Post-EPS IASI now in place: Next-Gen IASI to have 2x spectral and 2x radiometric resolution; same spatial resolution
 - Commercial Backing for GIFTS, now called Storm planned to launch in 2014.
- **NASA and NOAA**
 - Need to formulate a working group to discuss NWP, Climate and Composition requirements for future observations. Identify gaps!